



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/617,362	07/11/2003	John A. Lawton	021028-0304923	1509
43569	7590	02/07/2005	EXAMINER	
MAYER, BROWN, ROWE & MAW LLP 1909 K STREET, N.W. WASHINGTON, DC 20006			BERMAN, SUSAN W	
			ART UNIT	PAPER NUMBER

1711

DATE MAILED: 02/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/617,362	Applicant(s) LAWTON, JOHN A.	
	Examiner Susan W Berman	Art Unit 1711	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>11/03 (2 pages)</u> . | 6) <input type="checkbox"/> Other: ____. |

Drawings

The drawings are objected to because there are no labels on the axes of the graph shown in Figure 2. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 22 and 24-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 22, it is not clear what is meant by "E10 number". If applicant intends to set forth a photospeed having an E10 number of ... mJ/cm², it should be so stated. See pages 23-24 of the specification. In claim 24, it is not clear what process steps are required for "rapid prototyping" the composition. Claims 26-27 fail to clearly set forth the required process steps for "improving color

Art Unit: 1711

stability of an article". The single recited step of including a benzophenone photoinitiator in the composition prior to cure would not be expected to provide an article. The additional steps employed to obtain the article should be clearly set forth in the claims.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 23 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohkawa et al (5,434,196). Ohkawa et al disclose free radically curable compositions comprising a benzophenone photoinitiator. See examples 3, 4, 7, 8, 11 and 12. With respect to claim 25, Ohkawa et al teach rapid prototyping in column 13, lines 60-66. The article claimed in claim 25 obtained by the process of claim 24 is considered to be anticipated because the article obtained by Ohkawa et al is a polymerization product of a free radically curable component and a cationically curable component polymerized in the presence of a benzophenone as free radical photoinitiator. With respect to claim 26, Ohkawa et al do not mention color stability, however, the reference teaches a process for forming an article by curing a composition comprising a benzophenone photoinitiator. The claim is considered to be anticipated because Ohkawa et al teach the requirements of the process set forth in the claim and would thus be expected to inherently improve color stability of the cured article formed. With respect to claim 27, Ohkawa et al teach using a cationic photoinitiator in addition to a benzophenone.

Claims 23 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Beck et al (5,798,147). Beck et al disclose compositions wherein the photoinitiator can be benzophenone alone or in

Art Unit: 1711

combination with another photoinitiator (column 16, lines 16-29). Beck et al teach color stability in column 2, lines 33-39.

Claims 26-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyagawa et al (5,034,301). Miyagawa et al disclose free radically curable compositions comprising a colorant and a benzophenone photoinitiator to provide multi color images free of color deviation. See column 3, lines 28-37, column 14, line 30, to column 15, line 19. Mixtures of photoinitiators are used in the examples.

Claims 23, 25 and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 0 831 127 A1. EP '127 discloses compositions for stereolithography comprising cationically curable and free radically curable components, polyol and photoinitiator. The photoinitiators employed in the examples are benzophenone and 2-hydroxy-2-methyl-1-phenyl propanone. 1-hydroxycyclohexylphenylketone is also disclosed as a suitable acetophenone photoinitiator. See page 7, lines 4-8, and lines 12-13. The amount of photoinitiator to be used is from 0.05 to 10 wt. % (page 7, lines 18-22). Claim 23 is considered to be anticipated because EP '127 teaches compositions comprising benzophenone and teaches wt % of photoinitiator including 0.05 to less than 0.50 wt %, within the claimed range of 0.01 to less than 0.50 wt %. The article claimed in claim 25 obtained by the process of claim 24 is considered to be anticipated because EP '127 discloses an article that is a polymerization product of a free radically curable component and a cationically curable component polymerized in the presence of a benzophenone as free radical photoinitiator. With respect to claim 26, EP '127 teaches a process for curing a composition comprising a benzophenone to provide an article. The claim is considered to be anticipated because EP '127 teaches the requirements of the process set forth in the claim and would thus be expected to inherently improve color stability of the cured article formed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 831 127 A1 in view of Leo (4,600,649). EP '127 discloses compositions for stereolithography comprising cationically curable and free radically curable components, polyol and photoinitiator. Cycloaliphatic epoxides and oxetane compounds are taught. (Meth)acrylates of pentaerythritol are taught in page 6, lines 38-47. Polyether and polyester polyols are taught in page 7, lines 24-55. The photoinitiators employed in the examples are benzophenone or 2-hydroxy-2-methyl-1-phenyl propanone. 1-hydroxycyclohexyl phenyl ketone is also disclosed as a suitable acetophenone photoinitiator. See page 7, lines 4-8, and lines 12-13. The amount of photoinitiator to be used is from 0.05 to 10 wt. % (page 7, lines 18-22).

Leo teaches photoinitiators, preferably comprising a substituted acetophenone and benzophenone, for polymerizing poly(meth)acrylates. See the Abstract, column 3, line 62, to column 4, line 8 and Examples 1 and 2. Leo teaches that "substituted acetophenones are preferably used in combination with benzophenone to enable rapid and complete cure in an oxygen-containing atmosphere". The photoinitiators used in the examples are benzophenone and 1-hydroxycyclohexyl phenyl ketone.

The difference from the instantly claimed compositions is that EP '127 does not require a mixture of benzophenone and at least one other free radical photoinitiator not selected from benzophenones. However, EP '127 teaches that the disclosed photoinitiators may be used independently or in combination to attain a desired property (page 7, lines 18-22). Thus, It would have been obvious to one skilled in the art at the time of the invention to employ a mixture of photoinitiators comprising benzophenone, as taught

Art Unit: 1711

by Leo for photopolymerizing acrylate-functional materials, in the compositions disclosed by EP '127. EP '127 provides motivation by employing benzophenone in several examples and an acetophenone in the other examples and by teaching that mixtures of the disclosed photoinitiators can be employed to attain desired properties. Leo provides additional motivation by teaching that "substituted acetophenones are preferably used in combination with benzophenone to enable rapid and complete cure in an oxygen-containing atmosphere".

With respect to claims 4-6, 16 and 17, EP '127 teaches the free radical photoinitiator is to be used is from 0.05 to 10 wt. % of the free radically polymerizable component, thus suggesting that small amounts such as 1.5 or 0.5 wt % of the benzophenone can be used in combination with another free radical photoinitiator. EP '127 teaches using combinations of photoinitiators but does not mention any specific percents by weight of the individual photoinitiators in a combination. It would further have been obvious to one skilled in the art at the time of the invention when employing a mixture of photoinitiators, as discussed above, to determine the amounts of each photoinitiator required to obtain the properties desired in a particular application. With respect to claim 3, It would have been obvious to one skilled in the art at the time of the invention to select 1-hydroxycyclohexyl phenyl ketone from the ketones taught because EP '127 employs a phenyl ketone, 2-hydroxy-2-methyl-1-phenylpropanone-1-one, in the examples and teaches that 1-hydroxycyclohexyl phenyl ketone is an equivalent phenyl ketone (page 7, lines 1-8). With respect to claims 9-11, EP '127 teaches that (meth)acrylates of polyhydric alcohols are the most preferred free radically polymerizable compounds. The weight percents of components set forth in dependent claims are within the ranges taught by EP '127.

Claims 1-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 0 831 127 A1 in view of Mirle et al (5,418,112).

EP '127 discloses compositions for stereolithography comprising cationically curable and free radically curable components, polyol and photoinitiator. Cycloaliphatic epoxides and oxetane compounds are taught. (Meth)acrylates of pentaerythritol are taught in page 6, lines 38-47. Polyether and polyester polyols are taught in page 7, lines 24-55. The photoinitiators employed in the examples are benzophenone or 2-hydroxy-2-methyl-1-phenyl propanone. 1-hydroxycyclohexyl phenyl ketone is also disclosed as a suitable acetophenone photoinitiator. See page 7, lines 4-8, and lines 12-13. The amount of photoinitiator to be used is from 0.05 to 10 wt. % (page 7, lines 18-22).

Mirle et al disclose a preferred combination of photoinitiators for stereolithographic methods. The photoinitiator combination includes 1,2-dimethoxy-2-phenyl acetophenone, benzophenone and triphenyl phosphine. Mirle et al teach that enhanced photospeed is obtained when using the disclosed photoinitiator combination in (meth)acrylate functional compositions. See column 3, lines 27-31, column 4, lines 40-46, column 4, line 58, to column 5, line 55, and the examples.

The difference from the instantly claimed compositions is that EP '127 does not require a mixture of benzophenone and at least one other free radical photoinitiator not selected from benzophenones. However, EP '127 teaches that the disclosed photoinitiators may be used independently or in combination to attain a desired property (page 7, lines 18-22). Thus, It would have been obvious to one skilled in the art at the time of the invention to employ a mixture of photoinitiators comprising benzophenone, as taught by Mirle et al for photopolymerizing acrylate-functional materials, in the compositions disclosed by EP '127. EP '127 provides motivation by employing benzophenone in several examples and an acetophenone in the other examples and by teaching that mixtures of the disclosed photoinitiators can be employed to attain desired properties. Mirle et al provide additional motivation by teaching that enhanced photospeed is obtained when using the disclosed photoinitiator combination in (meth)acrylate functional compositions.

With respect to claims 4-6, 16 and 17, EP '127 teaches the free radical photoinitiator is to be used is from 0.05 to 10 wt. % of the free radically polymerizable component, thus suggesting that small amounts such as 1.5 or 0.5 wt % of the benzophenone can be used in combination with another free radical photoinitiator. EP '127 teaches using combinations of photoinitiators but does not mention any specific percents by weight of the individual photoinitiators in a combination. It would further have been obvious to one skilled in the art at the time of the invention when employing a mixture of photoinitiators, as discussed above, to determine the amounts of each photoinitiator required to obtain the properties desired in a particular application. With respect to claim 3, It would have been obvious to one skilled in the art at the time of the invention to select 1-hydroxycyclohexyl phenyl ketone from the ketones taught because EP '127 employs a phenyl ketone, 2-hydroxy-2-methyl-1-phenylpropanone-1one, in the examples and teaches that 1-hydroxycyclohexyl phenyl ketone is an equivalent phenyl ketone (page 7, lines 1-8). With respect to claims 9-11, EP '127 teaches that (meth)acrylates of polyhydric alcohols are the most preferred free radically polymerizable compounds. The weight percents of components set forth in dependent claims are within the ranges taught by EP '127.

Conclusion

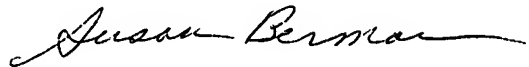
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bilodeau (6,545,064) discloses photoinitiators mixtures of benzophenone and 1-hydroxycyclohexyl phenyl ketone. Land (4,694,029) teaches radical photoinitiators including benzophenone and 1-hydroxycyclohexyl phenyl ketone used with an alcohol accelerator in cationically polymerizable compositions. The following references are considered to be cumulative of EP '127: Steinmann et al (5,468,886; 5,476,749; 5,476,748; 5,952,563), Melarisis et al (6,136,497; 6,350,403), and Krohn (6,509,389; 6,716,893; 6,805,917; 6,767,577). The following patents to Lawton are cited as art of interest: 6,811,937 and 6,287,748.

Art Unit: 1711

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan W Berman whose telephone number is 571 272 1067. The examiner can normally be reached on M-F 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on 571 272 1078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Susan W Berman
Primary Examiner
Art Unit 1711

SB
2/1/05